

STATE OF WASHINGTON

STATE BUILDING CODE COUNCIL

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June 13, 2013

TO: Building Fire and Plumbing Codes Committee Members

All Interested Parties

FROM: Solar PV Special Technical Advisory Group

SUBJECT: Solar PV TAG Report

Background

During the 2012 code adoption cycle, the Council received a proposal to amend new language in Chapter 6 of the 2012 IFC regarding installation of Solar PV panels in residential settings (Log #12-022). The Council initially referred the matter to the Fire Code TAG, which heard from the proponent and other interested parties; after further consideration of the proposal that TAG recommended the Council not adopt the language in the base code and form a special Solar PV TAG to address the issue.

2012 IFC Code Changes and Existing State Amendments

The 2012 IFC was completely reorganized from earlier versions; Section 605.11 Solar photovoltaic power systems, was a new code section in this cycle. Per the recommendation of the Fire TAG, that section was not adopted by the Council, and there are no existing state amendments on this subject matter.

Review of 2013 Proposed Amendments

The Council appointed the Solar PV TAG to include representatives of the solar industry and the fire safety community; also appointed were the state's Chief Electrical Inspector and other public officials. The PV TAG met six times from January through May 2013. They reviewed the IFC proposal that was tabled by the Council in 2012, Log#12-022, but ultimately chose to put that aside in favor of developing a new proposal. In addition to the IFC, they also reviewed language in the IBC and the IRC but did not make any recommendations for amendment to those codes. The TAG identified the need for one interpretation of the building code related to roof covering.

The TAG reached consensus on most portions of the proposal, and voted in favor of sending this proposal to the Standing Committee with a recommendation for approval to file for permanent rulemaking.

2013 Proposed changes to 2012 Fire Code

Log#	Proponent	Code Section(s)	Title or Subject	TAG Review			C:#
				Meet Criteria?	Economic Impact	Recommendation	Committee Action
12-022	Jeff Randall TABLED and referred to PV- TAG	605.11	Solar PV Power Systems	Yes		AM	

605.11 Solar photovoltaic power systems. Installation, modification, or alteration of solar photovoltaic power systems shall comply with this section. Due to the emerging technologies in the solar photovoltaic industry, it is understood fire code officials may need to amend prescriptive requirements of this section to meet the requirements for firefighter access and product installations. Section 104.9 Alternative materials and methods of this code shall be considered when approving the installation of solar photovoltaic power systems. Solar photovoltaic power systems shall be installed in accordance with Sections 605.11.1 through 605.11.4, the *International Building Code* and NFPA 70.

Exception: Detached, nonhabitable Group U structures including but not limited to parking shade structures, carports, solar trellises and similar structures shall not be subject to the requirements of this section sections 605.11.2 through 605.11.3.3.3.

- **605.11.1 Marking.** Marking is required on interior and exterior direct-current (DC) conduit, enclosures, raceways, cable assemblies, junction boxes, combiner boxes and disconnects.
 - **605.11.1.1 Materials.** The materials used for marking shall be reflective, weather resistant and suitable for the environment. Marking as required in Sections 605.11.1.2 through 605.11.1.4 shall have all letters capitalized with a minimum height of 3/8 inch (9.5 mm) white on red background.
 - 605.11.1.2 Marking content. The marking shall contain the words "WARNING-PHOTOVOLTAIC POWER SOURCE." 605.11.1.3 Main service disconnect. The marking shall be placed adjacent to the main service disconnect in a location clearly visible from the location where the disconnect is operated.
 - **605.11.1.4 Location of marking.** Marking shall be placed on interior and exterior DC conduit, raceways, enclosures and cable assemblies every 10 feet (3048 mm), within 1 foot (305 mm) of turns or bends and within 1 foot (305 mm) above and below penetrations of roof/ceiling assemblies, walls or barriers.
- 605.11.2 Locations of DC conductors. Conduit, wiring systems, and raceways for photovoltaic circuits shall be located as close as possible to the ridge or hip or valley and from the hip or valley as directly as possible to an outside wall to reduce trip hazards and maximize ventilation opportunities. Conduit runs between sub arrays and to DC combiner boxes shall be installed in a manner that minimizes the total amount of conduit on the roof by taking the shortest path from the array to the DC combiner box. The DC combiner boxes shall be located such that conduit runs are minimized in the pathways between arrays. DC wiring shall be installed in metallic conduit or raceways when located within enclosed spaces in a building. Conduit shall run along the bottom of load bearing
- **605.11.3** Access and pathways. Roof access, pathways, and spacing requirements shall be provided in accordance with Sections 605.11.3.1 through 605.11.3.3.3.

Exceptions:

- 1. Residential structures shall be designed so that each photovoltaic array is no greater than 150 feet (45 720 mm) by 150 feet (45 720 mm) in either axis.
- 2. Panels/modules shall be permitted to be located up to the roof ridge where an alternative ventilation method approved by the fire chief code official chief has been provided or where the fire chief has determined vertical ventilation techniques will not be employed.
- **605.11.3.1 Roof access points.** Roof access points shall be located in areas that do not require the placement of ground ladders over openings such as windows or doors, and located at strong points of building construction in locations where the access point does not conflict with overhead obstructions such as tree limbs, wires, or signs.
- **605.11.3.2 Residential systems for one- and two-family dwellings.** Access to residential systems for one- and two-family dwellings shall be provided in accordance with Sections 605.11.3.2.1 through 605.11.3.2.4.

Exceptions:

- 1. Residential dwellings with an approved automatic fire sprinkler system installed.
- 2. Residential dwellings with approved mechanical or passive ventilation systems.
- 3. Where the fire code official determines that the slope of the roof is too steep for emergency access.
- 4. Where the fire code official determines that vertical ventilation tactics will not be utilized.
- 5. Buildings under 10,000 s.f. in size where the solar array will cover less than 40% of the roof area over any floor.
- 605.11.3.2.1 Residential buildings with hip roof layouts. (NO PROPOSED CHANGES)
- 605.11.3.2.2 Residential buildings with a single ridge. (NO PROPOSED CHANGES)
- **605.11.3.2.3 Residential buildings with roof hips and valleys.** Panels/modules installed on residential buildings with roof hips and valleys shall be located no closer than 18 inches (457 mm) to a hip or a valley where panels/modules are to be placed on both sides of a hip or valley. Where panels are to be located on only one side of a hip or valley that is of equal length, the panels shall be permitted to be placed directly adjacent to the hip or valley.
- **Exception:** These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less. **605.11.3.2.4 Residential building smoke ventilation.** Panels/modules installed on residential buildings shall be located no higher than three feet (914 mm) 18 inches (457 mm) below the ridge in order to allow for fire department rooftop smoke ventilation operations.
- 605.11.3.3 Other than residential buildings. (NO PROPOSED CHANGES)
 - **605.11.3.3.1 Access.** (NO PROPOSED CHANGES)
 - 605.11.3.3.2 Pathways. (NO PROPOSED CHANGES)
 - 605.11.3.3.3 Smoke ventilation. (NO PROPOSED CHANGES)
- **605.11.4 Ground-mounted photovoltaic arrays.** Ground-mounted photovoltaic arrays shall comply with Sections 605.11 through 605.11.2 and this section. Setback requirements shall not apply to ground-mounted, free-standing photovoltaic arrays. A clear, brush-free area of 10 feet (3048 mm) shall be required for ground-mounted photovoltaic arrays.
- 605.11.3.3 Other than residential buildings. (NO PROPOSED CHANGES)
 - **605.11.3.3.1 Access.** (NO PROPOSED CHANGES)
 - 605.11.3.3.2 Pathways. (NO PROPOSED CHANGES)
 - 605.11.3.3.3 Smoke ventilation. (NO PROPOSED CHANGES)
- **605.11.4 Ground-mounted photovoltaic arrays.** Ground-mounted photovoltaic arrays shall comply with Sections 605.11 through 605.11.2 and this section. Setback requirements shall not apply to ground-mounted, free-standing photovoltaic arrays. A clear, brushfree area of 10 feet (3048 mm) shall be required for ground mounted photovoltaic arrays.

STAFF NOTE:

This proposal meets the required **Policy Criteria** for adoption of statewide amendments as listed in **WAC** 51-04-020, specifically item (2) below, as noted:

- (1) The amendment is needed to address a critical life/safety need.
- (2) The amendment is needed to address a specific state policy or statute.
 - I-937 requires new renewable energy sources
 - Production and tax incentives are available
 - 2012 State Energy Strategy
 - Rooftop Solar Challenge
- (3) The amendment is needed for consistency with state or federal regulations.
- (4) The amendment is needed to address a unique character of the state.
- (5) The amendment corrects errors and omissions.

This proposal meets the required Purposes/Objectives/Standards Criteria in RCW 19.27.020, specifically items (C) and (D) below:

- (A) To require minimum performance standards and requirements for construction and construction materials, consistent with accepted standards of engineering, fire and life safety.
- (B) To require standards and requirements in terms of performance and nationally accepted standards.
- (C) To permit the use of modern technical methods, devices and improvements.
- (D) To eliminate restrictive, obsolete, conflicting, duplicating and unnecessary regulations and requirements which could unnecessarily increase construction costs or **retard the use of new**

materials and methods of installation or provide unwarranted preferential treatment to types or classes of materials or products or methods of construction.

- (E) To provide for standards and specifications for making buildings and facilities accessible to and usable by physically disabled persons.
- (F) To consolidate within each authorized enforcement jurisdiction, the administration and enforcement of building codes.